

Grassland and carbon sequestration

Redmond McEvoy

Teagasc, Animal & Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork

Summary

- Grasslands in Europe act as a carbon sink and grazing systems are important for carbon storage.
- Carbon sequestration in grassland is influenced by many management factors.
- Sequestration can have benefits for both the atmosphere and farmer.

Introduction

Ireland has the largest proportion of land under grassland in Europe at 56.3%. This compares with an EU average grassland cover of 20.7%. The potential of grasslands as a carbon (C) sink is large. The livestock sector is responsible for approximately 14.5% of all anthropogenic greenhouse gas emissions worldwide. However grassland soils have the ability to sequester C and thereby partly offset C emissions.

What is carbon sequestration?

Carbon sequestration is a natural or artificial process by which carbon dioxide is removed from the atmosphere and held in solid or liquid form. Grasslands can absorb carbon dioxide (CO₂) during growth of grass plants and store it in different tissues. Above ground biomass is eaten by grazing animals and the C will eventually return to the soil as manure or to the atmosphere via enteric fermentation. The remaining grass and roots will eventually decompose and the C will then be stored in the soil.

Why is carbon sequestration important for farmers?

Soil carbon storage (SOC) is of interest to all due to the role it can play in removing CO₂ from the atmosphere. However grazing practices that favour SOC have benefits for farmers apart from carbon sequestration. These benefits include increasing the quality of the soil (soils with high C generally have better soil structure, water holding capacity and provide more nutrients), reduction in on-farm costs and added value of the final product.

What techniques impact on grassland carbon sequestration?

Studies have suggested that grassland soils can potentially act as significant C sinks. Land management practices can enable sequestration. Some examples of these possible management techniques to increase C sequestration include:

- Grazed pastures may sequester more C than grasslands used for silage or hay production, due to the recycling of organic matter and nutrients from faeces and plant residues.
- Improve fertiliser management. Combine liming treatments with nutrient fertilisation.
- Increase the time between re-seeding to at least five years, as this will contribute to organic matter build up — Cultivating the sward can result in soil disturbance resulting in C release.
- Ensure good grazing infrastructure — this will lead to less grassland damage and less frequent reseeded.
- Marinating permanent grassland and increasing the area of long term grassland by minimising short leys, maize and arable cropping can increase C sequestration.

- Managing grasslands for high plant diversity can enhance soil organic C. Increasing species in some grass swards can improve sequestration and reduce inorganic N inputs.

It is important to note that the effect of these management practices can depend on many factors including soil type, current soil C content, climate etc.

Conclusions

Different land management practices are potentially a tool to enable sequestration of atmospheric carbon into soils. The potential of grasslands as a sink for carbon in Europe is large.

Acknowledgement

NEFERTITI is an EU horizon 2020 project aiming to networking European farms to enhance cross fertilisation and innovation uptake through demonstration. 10 themes are addressed with one being Grassland and Carbon Sequestration. Register on <https://nefertiti-h2020.eu/> keep up-to-date with the project and demonstration events that will be ran in your region!

